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ABSTRACT

Since 1978, the University of Victoria has offered courses to students in British Columbia, using an interactive satellite delivery system. During that time both the system and the course design have become more sophisticated. Principles underlying program design include focusing on the learner and communication with learners, and basing televised segments on instructional rather than broader educational guidelines. Teaching and learning theories that guide the instructor are stressed as well as the usual principles of distance education course design. Student interaction is planned much more specifically than in a face-to-face classroom. Conclusions concerning communication via interactive satellite include the observation that interactions between instructor and student are more serious, deal with administration or course matters, are student controlled and non-continuous, and are based on the concept of the instructor as a content expert rather than on instructor personality or rapport with the class. Teaching via interactive satellite may require a re-examination of one's views of teaching and learning because of the frustration that can be created by a lack of sufficient knowledge of teaching, language, and communication theories, and because of the constraints imposed by the television medium. This report lists eight references. (Author/LMM)

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Teaching and Learning via Interactive Satellite -- A Janus View

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ABSTRACT

The University of Victoria has been involved in offering courses to students in British Columbia, Canada using an interactive satellite delivery system since 1978.

During that time, the system has become more sophisticated and so has our course design. Underlying our design are several principles: the focus of the system is the learner, the interactive satellite sessions are teaching sessions, communication with learners is emphasized and the televised segments are based on instructional rather than broader educational guidelines.

We have learned to stress not only the usual principles of course designs in distance education, but also the teaching and learning theories which guide the instructor and to plan for student interaction in a much more specific fashion than in a face-to-face classroom. Our conclusions concerning communication via interactive satellite are also discussed.

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Teaching and Learning via Interactive Satellite

- A Janus View

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In 1978, the University of Victoria, British Columbia, Canada was asked to participate in national educational experiments using the Canadian Hermes satellite. From those first beginnings, the University recognized the potential of a communications satellite in helping it achieve its goal of bringing University education to all of British Columbia, the most westerly of Canada's provinces and an area of 336,180 square miles.

The University's involvement therefore continued with the launching of the next satellite ANIK-B. In all, two university courses were offered during this experimental phase. These courses used a classroom-cum studio set with one fixed camera and an overhead camera. The courses were broadcast to approximately twelve locations around the province, who received the signal using an earth station. At this time the signal was not broadcast by local cable stations, so that the system was really a private communication network confined to those institutions which had receiving dishes.

One of the most remarkable features of the Hermes experiments was their utilization of the interactive capabilities of the satellite. This feature has been continued in all our course broadcasts. Essentially it means that programs are two-way audio-one-way video, so that the students can see, hear, and talk to the instructor who in turn, can hear and talk to them. During the first ANIK-B experiments, the students' responses to the instructor were carried via the satellite so that the communication system was close to a facsimile of face-to-face interaction.

In May, 1980, the provincial government set up an educational communications authority called the Knowledge Network of the West (KNOW) whose mandate was to act as the carrier and animator of programs to be carried on an educational channel broadcast via satellite and carried via cable into B.C. homes. Although British Columbia is mountainous, it holds the distinction of being the most heavily cabled province in Canada. This had an immediate effect on programming since by law, cable

stations are obligated to carry the educational channel. The provincial government further assisted by providing grants to local communities who wanted to purchase their own receiving dish. The number of communities receiving the Knowledge Network signal multiplied overnight and continues to grow.

In the Fall of 1980 the University offered two further courses, one in educational administration and the other a non-credit nursing course. Although the Knowledge Network had taken over, initially there was little change in the broadcast facilities. Two further courses were offered in the spring term. During our 1981 offerings, two major changes took place; broadcasts were moved to a television studio with mobile cameras and improved lighting and the audio signal from students which had been carried via satellite now utilized a land-line system, the regular telephone network. This latter decision, combined with the increasing number of locations accessing the signal, changed the system's orientation from private to public. It became a public access television channel and increased standards and stricter compliance with broadcast guidelines were requested.

In September 1982, a further change took place. With the aid of a microwave dish, we began to broadcast our courses from our own campus studio to the control room at KNOW (approximately 40 miles away) where the signal was uplinked to the satellite. The audio signal from students is still carried on land-lines but through use of our audio-conferencing bridge, we can link a number of student callers and the instructor together on-air in a way impossible since the beginning when the audio was carried via satellite.

The first course broadcast via ANIK-B in 1979 was on Supervision of Instruction, a senior level undergraduate credit course in Education. I was involved both in the overall planning of the course and in teaching one section. In the following two years, I taught three further courses using the satellite delivery system, and now I am a instructional designer working with faculty who wish to teach via distance education.

My involvement in distance education over this time has highlighted for me many of the issues involved in teaching and learning via distance education, and in particular those which involve interactive satellite as a major delivery vehicle. While these issues involve both teaching and learning facets, their common focus is communication with the learner, which is the central concern of all distance education. From

the point of view of a faculty member who is going to teach using this system, many issues become apparent: the utility of objectives, the demands for detailed planning, the choice of examples before ever meeting the clientele, the diminished amount of feedback, the loss of classroom dialogue, the differences between teaching and telling, the public nature of the television medium. From the learner's viewpoint, issues relate to clarity of expectations, time constraints, diminished opportunities for communication with the instructor and other students, fairness of grading procedures, feedback on work done, the usefulness of the broadcasts and the relationship between the course and the student's experience.

There are many similarities in the preparation of materials for a distance education course regardless of the media used. The objectives of the course have to be clearly stated, the content carefully chosen, and sequenced, the evaluation strategies delineated and all of the print materials gathered together prior to student registration.

The amount of planning involved when teaching at a distance cannot be too highly stressed. Unfortunately not all of this planning is focused on the instruction; too often, a detailed analysis of the course content is passed over for spirited discussions on which examples in which medium would be most effective. Rather, at first, planning should focus on the instructor's conceptualization of the course and on his definitions of teaching and learning. These steps are essential before production of materials are considered.

While it may not be difficult for an instructor to identify the goals of the course, probing may disclose that some of these may not be what he wants the students to be able to achieve. Further examination may reveal that while the content has been traditionally sequenced in one format, another may be more appropriate. Meyer (1982:95) in discussing the revamping of a distance education history course commented:

> "While not ignoring the usual materials covered in survey courses...., the usual concentration on endless numbers of personalities, events and dates that mark too much of the teaching of history from grade school up was abandoned.
>
> Instead a set of major issues that characterized the period under study was identified and conflicting approaches to the issue were

examined. For each course, the content sequence has to fit the needs of the learner as well as the objectives of the instructor".

Once a content sequence has been chosen, then focus should be placed on what learners have to know, in order to achieve that objective. It may be that the instructor has to design situations which will allow for either the rememberance of necessary pre-conditions or the learning of these. This may involve the development of a specific optional module. In each instance, the instructor is helped to re-examine the course objectives, its concepts, and its logical development. In on-campus instruction, one seldom has to justify what one is doing inside the general parameters of a course. Seldom does one prepare the total course in detail prior to meeting one's students. In distance education courses, however, one cannot wait to find out detailed information on student experiences prior to defining the course. That is why information processing analysis (Gagne and Briggs 1979:152) is so important in helping to ensure that all the steps necessary for student learning have been covered.

Since distance education puts major emphasis on the needs of the learner, it is essential to ensure that their various levels of experience, knowledge, and ways of learning are acknowledged. The course must be structured with as much versatility as possible to allow for the range of capabilities and cognitive strategies manifest in the learner population.

Within the last twenty years research in education has turned from an emphasis on good teaching to one focused on student learning. Like research on teaching, there is a long tradition of research on learning. Over the years two major ways of thinking about learning have been developed; the trial and error or stimulus-response work which adopted a model of learning as a series of discrete linked steps, and the Gestalt movement which considered the perception of data, the integration of new ideas with previous knowledge and the organization of information as the essential elements of learning. From the work of both of these schools, Gagne (1977) developed his hierarchial model of learning.

One of the areas Gagne deals with at some length is the acquisition of concepts, an area which is receiving major emphasis at present.

Many of the findings have particular applicability to distance education e.g., that the importance the student attaches to new learning depends on the related material he has stored in his long term memory. Ausubel et al (1978) in particular have stressed the influence previous information has on new data. Lovell (1980:139) commented that perhaps the most important contribution a teacher can make to the adult's learning of cognitive information is "to select, organize, present and translate new material in such a way that the learner can appreciate its relationship with ideas he already has clearly established in his memory. In this way the new ideas and information will stand the greatest chance of being retained in a clear, stable and unambiguous form. They will become part of the integrated and organized body of knowledge in the mind of the adult learner".

In order to put this into effect, the instructor has to identify the concepts within his subject matter, outline how these concepts interrelate, determine which concepts his students must know for these new concepts to be meaningful to them and integrate these basic concepts into the sequence of subject matter so that students can relate one to the other.

Not only does an instructor have to be fully conversant with his subject matter but, as importantly, he should also be able to discuss his own teaching style. Instructors vary in the extent to which they structure their content and involve their students, yet all instructional strategies have specific teaching and learning goals. The instructor must be aware of what strategies he prefers and why. For example, one instructor may prefer to present a idea using words alone. Another may use the blackboard to note important concepts or points as he presents the same idea. It is important in designing a distance education course for the instructor to be able to describe why he prefers one mode over the other, and to be able to identify these reasons in terms of the learner and his needs. Much of the popular literature on distance education course development is based on the course team model. Usually there is no designated instructor on the team and the major emphasis is on the design of materials which the learner is expected to use to teach himself. In these course development models the decisions concerning instructional strategies are closely linked to media delivery alternatives. It is at this point that most of the stories concerning battles between content specialists and media-oriented personnel over content versus media seem to origin-

ate. In models which involve an instructor who will have primary responsibility for the learners, the reality is more complex and less adversarial since the instructor's teaching style has to be considered in the determination of instructional strategies. While most instructors have a variety of teaching strategies in their repertorie, their initial choices for instruction in distance education are often those they most frequently used in face-to-face teaching. These choices have to be re-examined in terms of the objectives of the course, the skills of the learners, the sequence and complexity of the content as well as the skills of the instructor. As Potter (1983) argues, the instructor who is unable to describe an adequate rationale for his preferred instructional strategies, is at a disadvantage on the course team. In fact, it is impossible to implement strategies designed by the course team unless the instructor has the appropriate skills and is comfortable with these approaches.

The next step is to consider which parts of the content should be part of the print package and considered as essential pre-reading before an instructional broadcast, which should be taught using visual examples which needs to be a topic for discussion, and which should be considered as material for optional modules.

From our experience, the instructor most frequently wants to spend his "class time" on the interactive satellite dealing with the higher order objectives in Bloom's taxonomy; integration, analysis and evaluation. A recent BBC/OU study package "Learning from Television", (1982) which was based on experiences at the Open University, outlined four categories of uses for television. These were (a) those offering a particular experience e.g., watching a play, (b) those that provided an illustrated lecture, e.g., demonstration of an experiment, or analysis of a concept, (c) case studies, e.g., field trips, or specific dramatized situations, and (d) those where the learner is required to do something during the program with the information provided. At the University of Victoria, we started with the expectation that the time on the interactive satellite was to be used for direct instruction rather than to provide visual support to a primarily print package. We used as a format of organizing course material a pre-session/session/post-session sequence which allows for the delineation of a variety of compulsory and optional modules surrounding a number of interactive satellite sessions.

Many instructors find it difficult if not impossible to transfer

their classroom behaviour directly to television. In the confines of the classroom setting, the instructor is likely to roam around, to start discussions, where the students are major speakers and the instructor guides the dialogue and to encourage student speculation and recounting of experiences which the instructor, in turn, uses as raw data to link theoretical constructs and personal experience. For a number of reasons these situations are not readily duplicated on television. Therefore, it is all the more important for the instructor to know why he prefers these teaching behaviours so that the same goals can be planned for using situations more appropriate to distance education.

Perhaps the most disconcerting feature of television teaching for many instructors is the lack of non-verbal feedback. While the students can see you, you cannot see them. Furthermore, you have little idea of the extent to which they still observe the social protocols of the classroom. Do they talk casually during your presentation? Do they react verbally during your comments? Indeed, do they switch you off actually as well as metaphorically? Many of the cues you seek during an on-campus presentation are now absent. Are you going too fast or too slow? Are students following your arguments? In a face-to-face situation, you are at pains to put your class at ease and encourage them to seek clarification. With students at a distance you are much more dependent on them calling you for assistance, discussion or comment.

While your on-campus class is a group, an entity, this situation is much more difficult to foster for a television class. The University of Victoria has an on-campus policy of small class size even for undergraduate Arts and Science classes. Classes seldom reach over 25, and most can be conducted as discussions rather than lectures. In distance education the instructor has to recognize that his student clientele is likely to be over one hundred and yet each student may be receiving the program alone, so that simulataneously one is teaching to a single student and to a large group.

The medium of television further emphasizes the notion that the speaker is directing his comments at the viewer alone yet the anonymity of the system is such that a general request for student calls is not likely to generate any response. In such a situation, the student caller is aware that his comments are audible to all his fellow-students and he has little information about their attitudes and level of expertise. Even in a classroom setting, without group support many students hesitate

to ask what might be considered a naive question. The instructor, therefore has to plan his presentations in such a way that he can obtain estimates of the students' understanding and reactions. Role plays, off-air exercises and problem cases all provide excellent opportunities for reaction.

Holmberg (1982) refers to distance learning as a form of "mediated dialogue" and this term has some applicability to our situation. The interjection of technology changes the communication process in various ways. The following points illustrate the differences we found between mediated and immediate communication.

1). Interactions between instructor and student were different in tone. They were more serious. The casual comment about one student's acknowledged perspective guaranteed to raise smiles in a face-to-face setting was generally absent as was the natural flow of dialogue among students. This was most evident in courses broadcast after May 1980 when the system became public and when the physical actions necessary to enable a student to interject or ask a question changed from pressing a button to dialing a telephone number.

2). Interactions were different in kind. They dealt almost entirely with administrative or course matters. The elaboration of content through descriptions of actual experiences was seldom volunteered by students. However, instructors were able to generate a greater variety of responses using various instructional strategies. It was also evident that students husbanded their time very jealously and preferred to hear the instructor than an unknown fellow student whose comment might well be off-topic from their point of view.

3). Interactions were student controlled. For many instructors this proved to be the most difficult communication aspect to accept. In a classroom the social conventions obligate students to answer a question. Someone eventually cannot stand the silence and the expectancy of the instructor and speaks up. The line of last resort is to call on a specific student. That underlying social convention is absent in television teaching. The student makes the final decision and the instructor is dependent for a response solely on the quality of the question posed. Sometimes the student response is much more candid than one would receive in face-to-face instruction. One instructor posed a long convoluted question, paraphrazed it twice and then asked students to respond. The anonymous student

who called in said "P.h.h.h.....!" and hung up.

In a face to face setting, a non-response is considered a "plop", a cue that the comment was inappropriate and hence censored. For the distance teacher, the non-response may well mean that or may be a signal that students don't wish to discuss the point. After a recent program, a instructor met one of his students on-campus. "Why did you not call in"? the instructor chided. "Oh", came the reply, "I could have called and we would have argued x and y..." ending with a shrug of the shoulders. Evidently this student had some grasp of the various viewpoints related to the issue and which she preferred. She also didn't see any benefit to herself to discuss these with the instructor.

4). Interactions are non-continuous. After the instructor poses a question, there is at least a minute delay before the first student will reply. This time is taken up by the generation of the answer, the physical dialing of the number and the electronic transfer of the call to the instructor in the television studio. If the instructor wants other points of view he may then have to ask caller no. 2 to comment on caller no. 1's position. The instructor has to act as the host of the conversation so that the sudden interjection of comments by one student on what a colleague has just said is absent. Where students are watching in a group, and the person on the phone is relaying a group perspective the combination of delay and speech become further complicated.

5). Interaction between students and instructor are based on the notion of the instructor as content expert rather than on his personality and rapport with the class. The relationship between student and instructor which develops in a campus setting is almost impossible to duplicate in distance teaching since the instructor is known to students only from his television teaching sessions and telephone conversations with students who call his campus office.

The identification of these points emphasizes that the generation of student feedback during interactive teaching sessions has to be planned for as an integral part of the instructional strategy. While this is by no means unique to distance education or interactive television teaching, it seldom receives sufficient emphasis in on-campus instruction. The concerns associated with student feedback are those identified with [illegible]roup instruction. These have been clearly de-

lineated by Gagne and Briggs (1979:252), who also suggest various methods to overcome its imperfections.

These feedback mechanisms are designed to ensure that the instructor is teaching appropriately, that students understand and can interpret what is being taught in the light of their own experiences. Students also provide other feedback to the instructor, namely assignments and individual requests. This aspect of the communication link has received much less emphasis. Yet for students, the use of assignments as a basis for detailed and continued communication is as much desired by them, as feedback during instruction is by the instructor. The development of an adequate support and evaluation sub-system has to be addressed by the course planning team. Learners have to be provided with a variety of learning formats, and communication alternatives if we are to give any credence to research on adults (Knox: 1977).

Teaching via interactive satellite causes one to re-examine one's dearly held views of teaching and learning. At times, one may feel manipulated by the medium to be positive, up-beat and smiling despite one's own feelings of concern. At other times, the feeling may be primarily one of an automaton, doing, telling, asking in time to a pre-determined schedule. Both of these reactions, and the many other feelings of frustration that surface because on one hand, it is impossible to be as ad-hoc as one is in the classroom and on the other, the control of students' responses and reactions is always outside one's grasp, are not uncommon. They are perhaps due mainly to a lack of sufficient knowledge of teaching, learning and communication theories and of the constraints of the medium of television. The instructor who is prepared to examine not only his content expertise but also his knowledge of teaching and learning theories can be assured that he will successfully meet his objective to assist learners through dialogue to enhance their knowledge and understanding.

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